



UNITED STATES ENVIRONMENTAL PROTECTION AGENCY  
REGION 5 CHICAGO REGIONAL LABORATORY  
536 SOUTH CLARK STREET  
CHICAGO, ILLINOIS 60605



**Date:** 1/30/2015  
**Subject:** Review of Region 5 Data for BP Whiting Refinery  
**To:** Air Division, US EPA Region 5  
77 West Jackson Boulevard  
Chicago, IL 60605  
**From:** Wayne Whipple, Analyst  
US EPA Region 5 Chicago Regional Laboratory

The data transmitted under this cover memo successfully passed CRL's data review procedures as documented in the current Quality Management Plan and applicable Standard Operating Procedures. In accordance with EPA's *Guidance on Environmental Data Verification and Data Validation* (Document EPA QA/G-8), CRL verified and validated the data but does not perform data quality assessment based on project plans.

This report was reviewed and the information provided herein accurately represents the analysis performed.

X 

30 January, 2015

Please contact the analyst with any technical report issues, Amanda Wroble at (312)-353-0375 for sample project concerns, and Sylvia Griffin at (312)-353-9073 with data transmittal questions. Thank you.

**Attached are Results for: BP Whiting Refinery**

\_\_\_\_\_  
Data Management Coordinator and Date Transmitted

**Analyses included in this report:**

Air Toxics Reimer 5



Environmental Protection Agency Region 5  
**Chicago Regional Laboratory**

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Air Division, US EPA Region 5  
77 West Jackson Boulevard  
Chicago IL, 60605

Project: BP Whiting Refinery  
Project Number: [none]  
Project Manager: Motria Caudill

**Reported:**  
Jan-30-15 16:21

## Analysis Case Narrative for Volatile Organic Compounds (VOC) Air Toxics

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### General Information

Three 15 L canisters and two six liter canisters were received in good condition from the Air and Radiation Division monitoring group on October 2, 2014. The samples met hold time.

The samples were analyzed for VOC Air Toxics using SOP MS-005 Revision 6 with cold trap dehydration preconcentrator on Pegasus. (Reference Method US EPA TO-15). The following Pen and Ink changes to the SOP are applicable: MS005r6.0-PI01, PI02 and PI03. They allow the use of the instrument Pegasus along with listing the updated target compound list. The instrument manufacturer's recommended tune criteria is used in place of a BFB tune, and sample monitoring compound target concentrations control limits are updated.

Data are reported to a reporting limit of 25 pptv when possible and at least 35 pptv was requested in the Quality Assurance Project Plan, QAPP "EPA Region 5 VOC Sampling Method Comparison Version 1.1." All data quality objectives have been met except those listed below.

Sample monitoring compounds 1,1,1-trichloroethane and dichlorotetrafluoroethane are reported below the reporting limits for tracking of the sample monitoring compound. The results are within the expected global results, although they are still flagged as estimated because they are below their reporting limits. The results for 1,1,1-trichloroethane are also within 5 times the blank result but it is already flagged as estimated so no further action is required.

Samples -04 and -05 were higher in pressure because the regulators were not in proper calibration. This does not affect the data but the samples may have been collected under a shorter time integral than the other samples.

### Standard Operating Procedures (SOP) and Method Deviations

The criteria used for determining if system contamination influences the sample results is for a sample result to be over five times the contamination in the method blank or the canister certification check blank. If the difference between the blank and sample result is less than 5 times than the sample result is flagged B if compared to a method blank, or BC if compared to a canister blank.

LCS limits are the CCV limits from the SOP. The limits in the final report are for internal tracking purposes only.



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## Sample Analysis and Results

Calibration curve details are in data package 1409014.

Propene is a combination of propane and propene that cannot be resolved. The compound is flagged K as a high bias. Propene is also flagged as research quality and further information describing this is below (paragraph 3 quality control section).

Acrolein and 1,3-butadiene are flagged high bias because of interferences from hydrocarbons in all the samples that cannot be resolved. It is very likely the results are a large overestimate.

## Quality Control

Isopropyl alcohol failed the calibration and is flagged J as estimated and has failed the initial demonstration of capability (IDOC). Acetone and ethanol also failed the IDOC performance and accuracy and are flagged "J".

Propene failed the method detection and performance and accuracy studies during the IDOC but the data may be useful for this study and are reported as research data which does not have appropriate QC documented in the laboratory. An overestimate "K" is also assigned and explained above for the propene/propane coelution.

Ethanol failed a continuing calibration (B410041-BS1) and is flagged J in all samples.

Propene, F-113 (1,1,2-trichloro-1,2,2-trifluoromethane), cyclohexane, 2-butanone, acetone, dichlorotetrafluoroethane, and acrolein have their reporting limit raised to 50 pptv because the calibration curve lowest reporting limit was not acceptable up to the 50 pptv calibration level.

Acetone and isopropyl alcohol are both over the calibration curve in B410041-DUP. Both compounds are already flagged as estimated J.

Cyclohexane has extremely poor chromatography because of a coelution with an internal standard and therefore the results can only be estimated, J.

4-Ethyltoluene appears to be coeluting with an unknown aromatic hydrocarbon that has a similar mass spectrum. The peak is asymmetric suggesting the coelution. The result is reported as 4-ethyltoluene but with a K flag suggesting a high bias from the coelution. The unknown suspected compound is most likely a similar aromatic hydrocarbon.

Naphthalene is flagged as estimated because the performance of the analytical system is not reliable. Naphthalene has an acceptable calibration response above 250 pptv for that late eluting compound and it fails the second source calibration check (ICV).

Canisters for samples -02 and -03 were sampled without prior certification blank checks because the turnaround time did not permit the analysis. The canisters were cleaned in accordance with the MS-005 SOP. No data was qualified for canister blanks on those two canisters.



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**ANALYTICAL REPORT FOR SAMPLES**

Sample ID	Laboratory ID	Matrix	Date Sampled	Date Received
4	1410001-01	Air	Oct-02-14 08:30	Oct-02-14 15:00
1	1410001-02	Air	Oct-02-14 09:09	Oct-02-14 15:00
3	1410001-03	Air	Oct-02-14 09:56	Oct-02-14 15:00
2	1410001-04	Air	Oct-02-14 10:31	Oct-02-14 15:00
2	1410001-05	Air	Oct-02-14 10:31	Oct-02-14 15:00



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**Reported:**  
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**Air Toxics by GC/MS, EPA TO-15 (modified)**  
**US EPA Region 5 Chicago Regional Laboratory**

4 (1410001-01) Air Sampled: Oct-02-14 08:30 Received: Oct-02-14 15:00

Analyte	Result	Flags / Qualifiers	MDL	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed
Propene	1.40	K, Research	5.00E-3	0.0500	ppbv	1	B410041	Oct-02-14	Oct-02-14
Chloromethane	0.500		5.00E-3	0.0250	"	"	"	"	"
Vinyl chloride	U		5.00E-3	0.0250	"	"	"	"	"
1,3-butadiene	0.0564	B, BC, K	5.00E-3	0.0250	"	"	"	"	"
Bromomethane	7.93E-3		5.00E-3	0.0250	"	"	"	"	"
Chloroethane	U		5.00E-3	0.0250	"	"	"	"	"
Ethanol	1.49	J	5.00E-3	0.0250	"	"	"	"	"
Acrolein	0.780	K	5.00E-3	0.0250	"	"	"	"	"
1,1-Dichloroethene	U		5.00E-3	0.0250	"	"	"	"	"
Methylene chloride	0.120		5.00E-3	0.0250	"	"	"	"	"
Methyl tert-butyl ether	U		5.00E-3	0.0250	"	"	"	"	"
1,1-Dichloroethane	U		5.00E-3	0.0250	"	"	"	"	"
Vinyl acetate	0.0109		5.00E-3	0.0250	"	"	"	"	"
Hexane	0.477		5.00E-3	0.0250	"	"	"	"	"
2-Butanone	0.485		5.00E-3	0.0500	"	"	"	"	"
cis-1,2-Dichloroethene	U		5.00E-3	0.0250	"	"	"	"	"
trans-1,2-Dichloroethene	U		5.00E-3	0.0250	"	"	"	"	"
Chloroform	0.0353	BC	5.00E-3	0.0250	"	"	"	"	"
Ethyl acetate	0.238		5.00E-3	0.0250	"	"	"	"	"
1,2-Dichloroethane	0.0169		5.00E-3	0.0250	"	"	"	"	"
Cyclohexane	0.237	J	5.00E-3	0.0500	"	"	"	"	"
Tetrahydrofuran	U		5.00E-3	0.0250	"	"	"	"	"
Benzene	0.339		5.00E-3	0.0250	"	"	"	"	"
n-Heptane	0.206		5.00E-3	0.0250	"	"	"	"	"
1,2-Dichloropropane	U		5.00E-3	0.0250	"	"	"	"	"
Trichloroethene	U		5.00E-3	0.0250	"	"	"	"	"
Methyl methacrylate	U		5.00E-3	0.0250	"	"	"	"	"
1,4-Dioxane	6.12E-3		5.00E-3	0.0250	"	"	"	"	"
cis-1,3-Dichloropropene	U		5.00E-3	0.0250	"	"	"	"	"
4-Methyl-2-pentanone	0.0602		5.00E-3	0.0250	"	"	"	"	"
trans-1,3-Dichloropropene	U		5.00E-3	0.0250	"	"	"	"	"
1,1,2-Trichloroethane	U		5.00E-3	0.0250	"	"	"	"	"
Dibromochloromethane	U		5.00E-3	0.0250	"	"	"	"	"
Toluene	1.01		5.00E-3	0.0250	"	"	"	"	"
2-Hexanone	U		5.00E-3	0.0250	"	"	"	"	"



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Project Manager: Motria Caudill

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**Air Toxics by GC/MS, EPA TO-15 (modified)**  
**US EPA Region 5 Chicago Regional Laboratory**

4 (1410001-01) Air Sampled: Oct-02-14 08:30 Received: Oct-02-14 15:00

Analyte	Result	Flags / Qualifiers	MDL	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed
<b>1,2-Dibromoethane (EDB)</b>	<b>U</b>		5.00E-3	0.0250	ppbv	1	B410041	Oct-02-14	Oct-02-14
<b>Tetrachloroethene</b>	<b>0.0345</b>		5.00E-3	0.0250	"	"	"	"	"
<b>Chlorobenzene</b>	<b>U</b>		5.00E-3	0.0250	"	"	"	"	"
<b>Ethylbenzene</b>	<b>0.123</b>		5.00E-3	0.0250	"	"	"	"	"
<b>m+p-Xylene</b>	<b>0.394</b>		0.0100	0.0500	"	"	"	"	"
<b>Bromoform</b>	<b>U</b>		5.00E-3	0.0250	"	"	"	"	"
<b>Styrene</b>	<b>0.0416</b>		5.00E-3	0.0250	"	"	"	"	"
<b>1,1,2,2-Tetrachloroethane</b>	<b>U</b>		5.00E-3	0.0250	"	"	"	"	"
<b>o-Xylene</b>	<b>0.153</b>		5.00E-3	0.0250	"	"	"	"	"
<b>4-ethyltoluene</b>	<b>0.162</b>	K	5.00E-3	0.0250	"	"	"	"	"
<b>1,3,5-Trimethylbenzene</b>	<b>0.0475</b>		5.00E-3	0.0250	"	"	"	"	"
<b>1,2,4-Trimethylbenzene</b>	<b>0.161</b>		5.00E-3	0.0250	"	"	"	"	"
<b>1,3-Dichlorobenzene</b>	<b>U</b>		5.00E-3	0.0250	"	"	"	"	"
<b>Benzyl chloride</b>	<b>U</b>		5.00E-3	0.0250	"	"	"	"	"
<b>1,4-Dichlorobenzene</b>	<b>U</b>		5.00E-3	0.0250	"	"	"	"	"
<b>1,2-Dichlorobenzene</b>	<b>U</b>		5.00E-3	0.0250	"	"	"	"	"
<b>1,2,4-Trichlorobenzene</b>	<b>U</b>		5.00E-3	0.0250	"	"	"	"	"
<b>Naphthalene</b>	<b>0.862</b>	J	5.00E-3	0.0250	"	"	"	"	"

Surogate	Result		%REC	%REC Limits	Batch	Prepared	Analyzed
Surrogate: Dichlorodifluoromethane	0.432		85%	70-130	"	"	"
Surrogate: Dichlorotetrafluoroethane	0.0211	BC, J	106%	50-150	"	"	"
Surrogate: Trichlorofluoromethane	0.241		102%	70-130	"	"	"
Surrogate: 1,1,2-trichloro-1,2,2-trifluoroethane (F)	0.0801	BC	111%	70-130	"	"	"
Surrogate: 1,1,1-Trichloroethane	4.34E-3		108%	50-150	"	"	"
Surrogate: Carbon tetrachloride	0.0836		101%	70-130	"	"	"



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**Air Toxics by GC/MS, EPA TO-15 (modified)**  
**US EPA Region 5 Chicago Regional Laboratory**

**4 (1410001-01RE1) Air Sampled: Oct-02-14 08:30 Received: Oct-02-14 15:00**

Analyte	Result	Flags / Qualifiers	MDL	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed
Isopropyl alcohol	5.45	J	0.0250	0.125	ppbv	5	B410041	Oct-02-14	Oct-02-14
Acetone	3.96	BC, J	0.0250	0.250	"	"	"	"	"

**1 (1410001-02) Air Sampled: Oct-02-14 09:09 Received: Oct-02-14 15:00**

Analyte	Result	Flags / Qualifiers	MDL	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed
Propene	2.24	K, Research	5.00E-3	0.0500	ppbv	1	B410041	Oct-02-14	Oct-02-14
Chloromethane	0.594		5.00E-3	0.0250	"	"	"	"	"
Vinyl chloride	U		5.00E-3	0.0250	"	"	"	"	"
1,3-butadiene	0.0664	B, K	5.00E-3	0.0250	"	"	"	"	"
Bromomethane	6.58E-3		5.00E-3	0.0250	"	"	"	"	"
Chloroethane	U		5.00E-3	0.0250	"	"	"	"	"
Ethanol	1.40	J	5.00E-3	0.0250	"	"	"	"	"
Acrolein	1.06	K	5.00E-3	0.0250	"	"	"	"	"
Isopropyl alcohol	0.236	J	5.00E-3	0.0250	"	"	"	"	"
1,1-Dichloroethene	U		5.00E-3	0.0250	"	"	"	"	"
Methylene chloride	0.129	BC	5.00E-3	0.0250	"	"	"	"	"
Methyl tert-butyl ether	U		5.00E-3	0.0250	"	"	"	"	"
1,1-Dichloroethane	U		5.00E-3	0.0250	"	"	"	"	"
Vinyl acetate	8.97E-3		5.00E-3	0.0250	"	"	"	"	"
Hexane	0.856		5.00E-3	0.0250	"	"	"	"	"
2-Butanone	0.471		5.00E-3	0.0500	"	"	"	"	"
cis-1,2-Dichloroethene	U		5.00E-3	0.0250	"	"	"	"	"
trans-1,2-Dichloroethene	U		5.00E-3	0.0250	"	"	"	"	"
Chloroform	0.0301		5.00E-3	0.0250	"	"	"	"	"
Ethyl acetate	0.138		5.00E-3	0.0250	"	"	"	"	"
1,2-Dichloroethane	0.0182		5.00E-3	0.0250	"	"	"	"	"
Cyclohexane	0.652	J	5.00E-3	0.0500	"	"	"	"	"
Tetrahydrofuran	U		5.00E-3	0.0250	"	"	"	"	"
Benzene	0.401		5.00E-3	0.0250	"	"	"	"	"
n-Heptane	0.475		5.00E-3	0.0250	"	"	"	"	"
1,2-Dichloropropane	U		5.00E-3	0.0250	"	"	"	"	"
Trichloroethene	U		5.00E-3	0.0250	"	"	"	"	"
Methyl methacrylate	U		5.00E-3	0.0250	"	"	"	"	"
1,4-Dioxane	U		5.00E-3	0.0250	"	"	"	"	"



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**US EPA Region 5 Chicago Regional Laboratory**

1 (1410001-02) Air Sampled: Oct-02-14 09:09 Received: Oct-02-14 15:00

Analyte	Result	Flags / Qualifiers	MDL	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed
cis-1,3-Dichloropropene	U		5.00E-3	0.0250	ppbv	1	B410041	Oct-02-14	Oct-02-14
4-Methyl-2-pentanone	0.0976		5.00E-3	0.0250	"	"	"	"	"
trans-1,3-Dichloropropene	U		5.00E-3	0.0250	"	"	"	"	"
1,1,2-Trichloroethane	U		5.00E-3	0.0250	"	"	"	"	"
Dibromochloromethane	U		5.00E-3	0.0250	"	"	"	"	"
Toluene	0.876		5.00E-3	0.0250	"	"	"	"	"
2-Hexanone	U		5.00E-3	0.0250	"	"	"	"	"
1,2-Dibromoethane (EDB)	U		5.00E-3	0.0250	"	"	"	"	"
Tetrachloroethene	0.0236		5.00E-3	0.0250	"	"	"	"	"
Chlorobenzene	U		5.00E-3	0.0250	"	"	"	"	"
Ethylbenzene	0.157		5.00E-3	0.0250	"	"	"	"	"
m+p-Xylene	0.474		0.0100	0.0500	"	"	"	"	"
Bromoform	U		5.00E-3	0.0250	"	"	"	"	"
Styrene	0.0174		5.00E-3	0.0250	"	"	"	"	"
1,1,2,2-Tetrachloroethane	U		5.00E-3	0.0250	"	"	"	"	"
o-Xylene	0.176		5.00E-3	0.0250	"	"	"	"	"
4-ethyltoluene	0.172	K	5.00E-3	0.0250	"	"	"	"	"
1,3,5-Trimethylbenzene	0.0538		5.00E-3	0.0250	"	"	"	"	"
1,2,4-Trimethylbenzene	0.181		5.00E-3	0.0250	"	"	"	"	"
1,3-Dichlorobenzene	U		5.00E-3	0.0250	"	"	"	"	"
Benzyl chloride	U		5.00E-3	0.0250	"	"	"	"	"
1,4-Dichlorobenzene	U		5.00E-3	0.0250	"	"	"	"	"
1,2-Dichlorobenzene	U		5.00E-3	0.0250	"	"	"	"	"
1,2,4-Trichlorobenzene	U		5.00E-3	0.0250	"	"	"	"	"
Naphthalene	0.871	J	5.00E-3	0.0250	"	"	"	"	"

Surogate	Result		%REC	%REC Limits	Batch	Prepared	Analyzed
Surrogate: Dichlorodifluoromethane	0.465		91%	70-130	"	"	"
Surrogate: Dichlorotetrafluoroethane	0.0221	J	111%	50-150	"	"	"
Surrogate: Trichlorofluoromethane	0.224		95%	70-130	"	"	"
Surrogate: 1,1,2-trichloro-1,2,2-trifluoroethane (F)	0.0803		112%	70-130	"	"	"
Surrogate: 1,1,1-Trichloroethane	4.04E-3		101%	50-150	"	"	"
Surrogate: Carbon tetrachloride	0.0767		92%	70-130	"	"	"



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**Air Toxics by GC/MS, EPA TO-15 (modified)**  
**US EPA Region 5 Chicago Regional Laboratory**

**1 (1410001-02RE1) Air** Sampled: Oct-02-14 09:09 Received: Oct-02-14 15:00

Analyte	Result	Flags / Qualifiers	MDL	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed
Acetone	2.89	J	0.0250	0.250	ppbv	5	B410041	Oct-02-14	Oct-02-14

**3 (1410001-03) Air** Sampled: Oct-02-14 09:56 Received: Oct-02-14 15:00

Analyte	Result	Flags / Qualifiers	MDL	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed
Propene	1.34	K, Research	5.00E-3	0.0500	ppbv	1	B410041	Oct-02-14	Oct-02-14
Chloromethane	0.514		5.00E-3	0.0250	"	"	"	"	"
Vinyl chloride	U		5.00E-3	0.0250	"	"	"	"	"
1,3-butadiene	0.0419	B, K	5.00E-3	0.0250	"	"	"	"	"
Bromomethane	7.54E-3		5.00E-3	0.0250	"	"	"	"	"
Chloroethane	U		5.00E-3	0.0250	"	"	"	"	"
Ethanol	1.22	J	5.00E-3	0.0250	"	"	"	"	"
Acrolein	0.581	K	5.00E-3	0.0250	"	"	"	"	"
Isopropyl alcohol	0.150	J	5.00E-3	0.0250	"	"	"	"	"
1,1-Dichloroethene	U		5.00E-3	0.0250	"	"	"	"	"
Methylene chloride	0.113	BC	5.00E-3	0.0250	"	"	"	"	"
Methyl tert-butyl ether	U		5.00E-3	0.0250	"	"	"	"	"
1,1-Dichloroethane	U		5.00E-3	0.0250	"	"	"	"	"
Vinyl acetate	6.36E-3		5.00E-3	0.0250	"	"	"	"	"
Hexane	0.367		5.00E-3	0.0250	"	"	"	"	"
2-Butanone	0.467		5.00E-3	0.0500	"	"	"	"	"
cis-1,2-Dichloroethene	U		5.00E-3	0.0250	"	"	"	"	"
trans-1,2-Dichloroethene	U		5.00E-3	0.0250	"	"	"	"	"
Chloroform	0.0286		5.00E-3	0.0250	"	"	"	"	"
Ethyl acetate	0.170		5.00E-3	0.0250	"	"	"	"	"
1,2-Dichloroethane	0.0159		5.00E-3	0.0250	"	"	"	"	"
Cyclohexane	0.244	J	5.00E-3	0.0500	"	"	"	"	"
Tetrahydrofuran	U		5.00E-3	0.0250	"	"	"	"	"
Benzene	0.259		5.00E-3	0.0250	"	"	"	"	"
n-Heptane	0.178		5.00E-3	0.0250	"	"	"	"	"
1,2-Dichloropropane	U		5.00E-3	0.0250	"	"	"	"	"
Trichloroethene	U		5.00E-3	0.0250	"	"	"	"	"
Methyl methacrylate	U		5.00E-3	0.0250	"	"	"	"	"
1,4-Dioxane	0.0101		5.00E-3	0.0250	"	"	"	"	"
cis-1,3-Dichloropropene	U		5.00E-3	0.0250	"	"	"	"	"



Environmental Protection Agency Region 5  
**Chicago Regional Laboratory**

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Air Division, US EPA Region 5  
77 West Jackson Boulevard  
Chicago IL, 60605

Project: BP Whiting Refinery  
Project Number: [none]  
Project Manager: Motria Caudill

**Reported:**  
Jan-30-15 16:21

**Air Toxics by GC/MS, EPA TO-15 (modified)**  
**US EPA Region 5 Chicago Regional Laboratory**

3 (1410001-03) Air Sampled: Oct-02-14 09:56 Received: Oct-02-14 15:00

Analyte	Result	Flags / Qualifiers	MDL	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed
4-Methyl-2-pentanone	0.0501		5.00E-3	0.0250	ppbv	1	B410041	Oct-02-14	Oct-02-14
trans-1,3-Dichloropropene	U		5.00E-3	0.0250	"	"	"	"	"
1,1,2-Trichloroethane	U		5.00E-3	0.0250	"	"	"	"	"
Dibromochloromethane	U		5.00E-3	0.0250	"	"	"	"	"
Toluene	0.555		5.00E-3	0.0250	"	"	"	"	"
2-Hexanone	U		5.00E-3	0.0250	"	"	"	"	"
1,2-Dibromoethane (EDB)	U		5.00E-3	0.0250	"	"	"	"	"
Tetrachloroethene	0.0192		5.00E-3	0.0250	"	"	"	"	"
Chlorobenzene	U		5.00E-3	0.0250	"	"	"	"	"
Ethylbenzene	0.0852		5.00E-3	0.0250	"	"	"	"	"
m+p-Xylene	0.267		0.0100	0.0500	"	"	"	"	"
Bromoform	U		5.00E-3	0.0250	"	"	"	"	"
Styrene	0.0163		5.00E-3	0.0250	"	"	"	"	"
1,1,2,2-Tetrachloroethane	U		5.00E-3	0.0250	"	"	"	"	"
o-Xylene	0.101		5.00E-3	0.0250	"	"	"	"	"
4-ethyltoluene	0.105	K	5.00E-3	0.0250	"	"	"	"	"
1,3,5-Trimethylbenzene	0.0314		5.00E-3	0.0250	"	"	"	"	"
1,2,4-Trimethylbenzene	0.102		5.00E-3	0.0250	"	"	"	"	"
1,3-Dichlorobenzene	U		5.00E-3	0.0250	"	"	"	"	"
Benzyl chloride	U		5.00E-3	0.0250	"	"	"	"	"
1,4-Dichlorobenzene	7.92E-3		5.00E-3	0.0250	"	"	"	"	"
1,2-Dichlorobenzene	U		5.00E-3	0.0250	"	"	"	"	"
1,2,4-Trichlorobenzene	U		5.00E-3	0.0250	"	"	"	"	"
Naphthalene	0.778	J	5.00E-3	0.0250	"	"	"	"	"

Surogate	Result		%REC	%REC Limits	Batch	Prepared	Analyzed
Surrogate: Dichlorodifluoromethane	0.461		90%	70-130	"	"	"
Surrogate: Dichlorotetrafluoroethane	0.0224	J	112%	50-150	"	"	"
Surrogate: Trichlorofluoromethane	0.223		95%	70-130	"	"	"
Surrogate: 1,1,2-trichloro-1,2,2-trifluoroethane (F)	0.0821		114%	70-130	"	"	"
Surrogate: 1,1,1-Trichloroethane	3.98E-3		100%	50-150	"	"	"
Surrogate: Carbon tetrachloride	0.0819		99%	70-130	"	"	"



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Chicago IL, 60605

Project: BP Whiting Refinery  
Project Number: [none]  
Project Manager: Motria Caudill

**Reported:**  
Jan-30-15 16:21

**Air Toxics by GC/MS, EPA TO-15 (modified)**  
**US EPA Region 5 Chicago Regional Laboratory**

**3 (1410001-03RE1) Air Sampled: Oct-02-14 09:56 Received: Oct-02-14 15:00**

Analyte	Result	Flags / Qualifiers	MDL	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed
Acetone	3.39	J	0.0250	0.250	ppbv	5	B410041	Oct-02-14	Oct-02-14

**2 (1410001-04) Air Sampled: Oct-02-14 10:31 Received: Oct-02-14 15:00**

Analyte	Result	Flags / Qualifiers	MDL	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed
Propene	1.60	K, Research	5.00E-3	0.0500	ppbv	1	B410041	Oct-02-14	Oct-02-14
Chloromethane	0.525		5.00E-3	0.0250	"	"	"	"	"
Vinyl chloride	U		5.00E-3	0.0250	"	"	"	"	"
1,3-butadiene	0.0546	B, K	5.00E-3	0.0250	"	"	"	"	"
Bromomethane	6.87E-3		5.00E-3	0.0250	"	"	"	"	"
Chloroethane	0.0101		5.00E-3	0.0250	"	"	"	"	"
Ethanol	1.47	J	5.00E-3	0.0250	"	"	"	"	"
Acrolein	0.642	K	5.00E-3	0.0250	"	"	"	"	"
1,1-Dichloroethene	U		5.00E-3	0.0250	"	"	"	"	"
Methylene chloride	0.120		5.00E-3	0.0250	"	"	"	"	"
Methyl tert-butyl ether	U		5.00E-3	0.0250	"	"	"	"	"
1,1-Dichloroethane	U		5.00E-3	0.0250	"	"	"	"	"
Vinyl acetate	8.10E-3		5.00E-3	0.0250	"	"	"	"	"
Hexane	0.462		5.00E-3	0.0250	"	"	"	"	"
2-Butanone	0.500		5.00E-3	0.0500	"	"	"	"	"
cis-1,2-Dichloroethene	U		5.00E-3	0.0250	"	"	"	"	"
trans-1,2-Dichloroethene	9.74E-3		5.00E-3	0.0250	"	"	"	"	"
Chloroform	0.0290		5.00E-3	0.0250	"	"	"	"	"
Ethyl acetate	0.279		5.00E-3	0.0250	"	"	"	"	"
1,2-Dichloroethane	0.0163		5.00E-3	0.0250	"	"	"	"	"
Cyclohexane	0.336	J	5.00E-3	0.0500	"	"	"	"	"
Tetrahydrofuran	U		5.00E-3	0.0250	"	"	"	"	"
Benzene	0.331		5.00E-3	0.0250	"	"	"	"	"
n-Heptane	0.220		5.00E-3	0.0250	"	"	"	"	"
1,2-Dichloropropane	U		5.00E-3	0.0250	"	"	"	"	"
Trichloroethene	U		5.00E-3	0.0250	"	"	"	"	"
Methyl methacrylate	U		5.00E-3	0.0250	"	"	"	"	"
1,4-Dioxane	U		5.00E-3	0.0250	"	"	"	"	"
cis-1,3-Dichloropropene	U		5.00E-3	0.0250	"	"	"	"	"
4-Methyl-2-pentanone	0.0619		5.00E-3	0.0250	"	"	"	"	"



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Project: BP Whiting Refinery  
Project Number: [none]  
Project Manager: Motria Caudill

**Reported:**  
Jan-30-15 16:21

**Air Toxics by GC/MS, EPA TO-15 (modified)**  
**US EPA Region 5 Chicago Regional Laboratory**

2 (1410001-04) Air Sampled: Oct-02-14 10:31 Received: Oct-02-14 15:00

Analyte	Result	Flags / Qualifiers	MDL	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed
trans-1,3-Dichloropropene	U		5.00E-3	0.0250	ppbv	1	B410041	Oct-02-14	Oct-02-14
1,1,2-Trichloroethane	U		5.00E-3	0.0250	"	"	"	"	"
Dibromochloromethane	U		5.00E-3	0.0250	"	"	"	"	"
Toluene	1.04		5.00E-3	0.0250	"	"	"	"	"
2-Hexanone	U		5.00E-3	0.0250	"	"	"	"	"
1,2-Dibromoethane (EDB)	U		5.00E-3	0.0250	"	"	"	"	"
Tetrachloroethene	0.0269		5.00E-3	0.0250	"	"	"	"	"
Chlorobenzene	U		5.00E-3	0.0250	"	"	"	"	"
Ethylbenzene	0.137		5.00E-3	0.0250	"	"	"	"	"
m+p-Xylene	0.437		0.0100	0.0500	"	"	"	"	"
Bromoform	U		5.00E-3	0.0250	"	"	"	"	"
Styrene	0.0288		5.00E-3	0.0250	"	"	"	"	"
1,1,2,2-Tetrachloroethane	U		5.00E-3	0.0250	"	"	"	"	"
o-Xylene	0.165		5.00E-3	0.0250	"	"	"	"	"
4-ethyltoluene	0.143	K	5.00E-3	0.0250	"	"	"	"	"
1,3,5-Trimethylbenzene	0.0418		5.00E-3	0.0250	"	"	"	"	"
1,2,4-Trimethylbenzene	0.136		5.00E-3	0.0250	"	"	"	"	"
1,3-Dichlorobenzene	U		5.00E-3	0.0250	"	"	"	"	"
Benzyl chloride	U		5.00E-3	0.0250	"	"	"	"	"
1,4-Dichlorobenzene	5.47E-3		5.00E-3	0.0250	"	"	"	"	"
1,2-Dichlorobenzene	U		5.00E-3	0.0250	"	"	"	"	"
1,2,4-Trichlorobenzene	U		5.00E-3	0.0250	"	"	"	"	"
Naphthalene	0.876	J	5.00E-3	0.0250	"	"	"	"	"

Surogate	Result		%REC	%REC Limits	Batch	Prepared	Analyzed
Surrogate: Dichlorodifluoromethane	0.471		92%	70-130	"	"	"
Surrogate: Dichlorotetrafluoroethane	0.0226	J	113%	50-150	"	"	"
Surrogate: Trichlorofluoromethane	0.226		96%	70-130	"	"	"
Surrogate: 1,1,2-trichloro-1,2,2-trifluoroethane (F)	0.0795		110%	70-130	"	"	"
Surrogate: 1,1,1-Trichloroethane	3.84E-3		96%	50-150	"	"	"
Surrogate: Carbon tetrachloride	0.0887		107%	70-130	"	"	"



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Project: BP Whiting Refinery  
Project Number: [none]  
Project Manager: Motria Caudill

**Reported:**  
Jan-30-15 16:21

**Air Toxics by GC/MS, EPA TO-15 (modified)**  
**US EPA Region 5 Chicago Regional Laboratory**

**2 (1410001-04RE1) Air Sampled: Oct-02-14 10:31 Received: Oct-02-14 15:00**

Analyte	Result	Flags / Qualifiers	MDL	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed
Isopropyl alcohol	5.02	J	0.0250	0.125	ppbv	5	B410041	Oct-02-14	Oct-02-14
Acetone	3.86	J	0.0250	0.250	"	"	"	"	"

**2 (1410001-05) Air Sampled: Oct-02-14 10:31 Received: Oct-02-14 15:00**

Analyte	Result	Flags / Qualifiers	MDL	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed
Propene	1.58	K, Research	5.00E-3	0.0500	ppbv	1	B410041	Oct-02-14	Oct-02-14
Chloromethane	0.531		5.00E-3	0.0250	"	"	"	"	"
Vinyl chloride	U		5.00E-3	0.0250	"	"	"	"	"
1,3-butadiene	0.0484	B, K	5.00E-3	0.0250	"	"	"	"	"
Bromomethane	7.25E-3		5.00E-3	0.0250	"	"	"	"	"
Chloroethane	0.0103		5.00E-3	0.0250	"	"	"	"	"
Ethanol	1.51	J	5.00E-3	0.0250	"	"	"	"	"
Acrolein	0.617	K	5.00E-3	0.0250	"	"	"	"	"
1,1-Dichloroethene	U		5.00E-3	0.0250	"	"	"	"	"
Methylene chloride	0.122		5.00E-3	0.0250	"	"	"	"	"
Methyl tert-butyl ether	U		5.00E-3	0.0250	"	"	"	"	"
1,1-Dichloroethane	U		5.00E-3	0.0250	"	"	"	"	"
Vinyl acetate	8.57E-3		5.00E-3	0.0250	"	"	"	"	"
Hexane	0.462		5.00E-3	0.0250	"	"	"	"	"
2-Butanone	0.520		5.00E-3	0.0500	"	"	"	"	"
cis-1,2-Dichloroethene	U		5.00E-3	0.0250	"	"	"	"	"
trans-1,2-Dichloroethene	0.0106		5.00E-3	0.0250	"	"	"	"	"
Chloroform	0.0354		5.00E-3	0.0250	"	"	"	"	"
Ethyl acetate	0.262		5.00E-3	0.0250	"	"	"	"	"
1,2-Dichloroethane	0.0158		5.00E-3	0.0250	"	"	"	"	"
Cyclohexane	0.333	J	5.00E-3	0.0500	"	"	"	"	"
Tetrahydrofuran	U		5.00E-3	0.0250	"	"	"	"	"
Benzene	0.331		5.00E-3	0.0250	"	"	"	"	"
n-Heptane	0.219		5.00E-3	0.0250	"	"	"	"	"
1,2-Dichloropropane	U		5.00E-3	0.0250	"	"	"	"	"
Trichloroethene	U		5.00E-3	0.0250	"	"	"	"	"
Methyl methacrylate	U		5.00E-3	0.0250	"	"	"	"	"
1,4-Dioxane	U		5.00E-3	0.0250	"	"	"	"	"
cis-1,3-Dichloropropene	U		5.00E-3	0.0250	"	"	"	"	"



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Project: BP Whiting Refinery  
Project Number: [none]  
Project Manager: Motria Caudill

**Reported:**  
Jan-30-15 16:21

**Air Toxics by GC/MS, EPA TO-15 (modified)**  
**US EPA Region 5 Chicago Regional Laboratory**

2 (1410001-05) Air Sampled: Oct-02-14 10:31 Received: Oct-02-14 15:00

Analyte	Result	Flags / Qualifiers	MDL	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed
4-Methyl-2-pentanone	0.0630		5.00E-3	0.0250	ppbv	1	B410041	Oct-02-14	Oct-02-14
trans-1,3-Dichloropropene	U		5.00E-3	0.0250	"	"	"	"	"
1,1,2-Trichloroethane	U		5.00E-3	0.0250	"	"	"	"	"
Dibromochloromethane	U		5.00E-3	0.0250	"	"	"	"	"
Toluene	1.03		5.00E-3	0.0250	"	"	"	"	"
2-Hexanone	U		5.00E-3	0.0250	"	"	"	"	"
1,2-Dibromoethane (EDB)	U		5.00E-3	0.0250	"	"	"	"	"
Tetrachloroethene	0.0281		5.00E-3	0.0250	"	"	"	"	"
Chlorobenzene	U		5.00E-3	0.0250	"	"	"	"	"
Ethylbenzene	0.136		5.00E-3	0.0250	"	"	"	"	"
m+p-Xylene	0.436		0.0100	0.0500	"	"	"	"	"
Bromoform	U		5.00E-3	0.0250	"	"	"	"	"
Styrene	0.0261		5.00E-3	0.0250	"	"	"	"	"
1,1,2,2-Tetrachloroethane	U		5.00E-3	0.0250	"	"	"	"	"
o-Xylene	0.163		5.00E-3	0.0250	"	"	"	"	"
4-ethyltoluene	0.140	K	5.00E-3	0.0250	"	"	"	"	"
1,3,5-Trimethylbenzene	0.0398		5.00E-3	0.0250	"	"	"	"	"
1,2,4-Trimethylbenzene	0.134		5.00E-3	0.0250	"	"	"	"	"
1,3-Dichlorobenzene	U		5.00E-3	0.0250	"	"	"	"	"
Benzyl chloride	U		5.00E-3	0.0250	"	"	"	"	"
1,4-Dichlorobenzene	6.17E-3		5.00E-3	0.0250	"	"	"	"	"
1,2-Dichlorobenzene	U		5.00E-3	0.0250	"	"	"	"	"
1,2,4-Trichlorobenzene	U		5.00E-3	0.0250	"	"	"	"	"
Naphthalene	0.805	J	5.00E-3	0.0250	"	"	"	"	"

Surogate	Result		%REC	%REC Limits	Batch	Prepared	Analyzed
Surrogate: Dichlorodifluoromethane	0.470		92%	70-130	"	"	"
Surrogate: Dichlorotetrafluoroethane	0.0234	BC, J	117%	50-150	"	"	"
Surrogate: Trichlorofluoromethane	0.227		96%	70-130	"	"	"
Surrogate: 1,1,2-trichloro-1,2,2-trifluoroethane (F)	0.0818		114%	70-130	"	"	"
Surrogate: 1,1,1-Trichloroethane	4.42E-3		110%	50-150	"	"	"
Surrogate: Carbon tetrachloride	0.0835		101%	70-130	"	"	"



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Project: BP Whiting Refinery  
Project Number: [none]  
Project Manager: Motria Caudill

**Reported:**  
Jan-30-15 16:21

**Air Toxics by GC/MS, EPA TO-15 (modified)**  
**US EPA Region 5 Chicago Regional Laboratory**

**2 (1410001-05RE1) Air** Sampled: Oct-02-14 10:31 Received: Oct-02-14 15:00

Analyte	Result	Flags / Qualifiers	MDL	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed
<b>Isopropyl alcohol</b>	<b>5.24</b>	J	0.0250	0.125	ppbv	5	B410041	Oct-02-14	Oct-02-14
<b>Acetone</b>	<b>4.02</b>	J, BC	0.0250	0.250	"	"	"	"	"



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Project Number: [none]  
Project Manager: Motria Caudill

**Reported:**  
Jan-30-15 16:21

**Air Toxics by GC/MS, EPA TO-15 (modified) - Quality Control**  
**US EPA Region 5 Chicago Regional Laboratory**

**Batch B410041 - ColdTrap Dehydration**

Blank (B410041-BLK1)

Prepared & Analyzed: Oct-02-14

Analyte	Result	Flags / Qualifiers	MDL	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit
Propene	0.0734	Research	5.00E-3	0.0500	ppbv						
Chloromethane	U		5.00E-3	0.0250	"						
Vinyl chloride	U		5.00E-3	0.0250	"						
1,3-butadiene	0.0288		5.00E-3	0.0250	"						
Bromomethane	U		5.00E-3	0.0250	"						
Chloroethane	U		5.00E-3	0.0250	"						
Ethanol	0.129	J	5.00E-3	0.0250	"						
Acrolein	U		5.00E-3	0.0250	"						
Isopropyl alcohol	U	J	5.00E-3	0.0250	"						
Acetone	0.0182	J	5.00E-3	0.0500	"						
1,1-Dichloroethene	U		5.00E-3	0.0250	"						
Methylene chloride	U		5.00E-3	0.0250	"						
Methyl tert-butyl ether	U		5.00E-3	0.0250	"						
1,1-Dichloroethane	U		5.00E-3	0.0250	"						
Vinyl acetate	U		5.00E-3	0.0250	"						
Hexane	U		5.00E-3	0.0250	"						
2-Butanone	0.0126		5.00E-3	0.0500	"						
cis-1,2-Dichloroethene	U		5.00E-3	0.0250	"						
trans-1,2-Dichloroethene	U		5.00E-3	0.0250	"						
Chloroform	U		5.00E-3	0.0250	"						
Ethyl acetate	U		5.00E-3	0.0250	"						
1,2-Dichloroethane	U		5.00E-3	0.0250	"						
Cyclohexane	U	J	5.00E-3	0.0500	"						
Tetrahydrofuran	U		5.00E-3	0.0250	"						
Benzene	U		5.00E-3	0.0250	"						
n-Heptane	U		5.00E-3	0.0250	"						
1,2-Dichloropropane	U		5.00E-3	0.0250	"						
Trichloroethene	U		5.00E-3	0.0250	"						
Methyl methacrylate	U		5.00E-3	0.0250	"						
1,4-Dioxane	7.09E-3		5.00E-3	0.0250	"						
cis-1,3-Dichloropropene	U		5.00E-3	0.0250	"						
4-Methyl-2-pentanone	7.44E-3		5.00E-3	0.0250	"						
trans-1,3-Dichloropropene	U		5.00E-3	0.0250	"						



Environmental Protection Agency Region 5  
**Chicago Regional Laboratory**

536 South Clark Street, Chicago, IL 60605  
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Air Division, US EPA Region 5  
77 West Jackson Boulevard  
Chicago IL, 60605

Project: BP Whiting Refinery  
Project Number: [none]  
Project Manager: Motria Caudill

**Reported:**  
Jan-30-15 16:21

**Air Toxics by GC/MS, EPA TO-15 (modified) - Quality Control**  
**US EPA Region 5 Chicago Regional Laboratory**

**Batch B410041 - ColdTrap Dehydration**

Blank (B410041-BLK1)

Prepared & Analyzed: Oct-02-14

Analyte	Result	Flags / Qualifiers	MDL	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit
1,1,2-Trichloroethane	U		5.00E-3	0.0250	ppbv						
Dibromochloromethane	U		5.00E-3	0.0250	"						
Toluene	7.40E-3		5.00E-3	0.0250	"						
2-Hexanone	6.91E-3		5.00E-3	0.0250	"						
1,2-Dibromoethane (EDB)	U		5.00E-3	0.0250	"						
Tetrachloroethene	U		5.00E-3	0.0250	"						
Chlorobenzene	U		5.00E-3	0.0250	"						
Ethylbenzene	U		5.00E-3	0.0250	"						
m+p-Xylene	0.0133		0.0100	0.0500	"						
Bromoform	U		5.00E-3	0.0250	"						
Styrene	U		5.00E-3	0.0250	"						
1,1,2,2-Tetrachloroethane	U		5.00E-3	0.0250	"						
o-Xylene	6.94E-3		5.00E-3	0.0250	"						
4-ethyltoluene	U	K	5.00E-3	0.0250	"						
1,3,5-Trimethylbenzene	U		5.00E-3	0.0250	"						
1,2,4-Trimethylbenzene	U		5.00E-3	0.0250	"						
1,3-Dichlorobenzene	U		5.00E-3	0.0250	"						
Benzyl chloride	6.91E-3		5.00E-3	0.0250	"						
1,4-Dichlorobenzene	U		5.00E-3	0.0250	"						
1,2-Dichlorobenzene	U		5.00E-3	0.0250	"						
1,2,4-Trichlorobenzene	U		5.00E-3	0.0250	"						
Naphthalene	0.0331	J	5.00E-3	0.0250	"						
Surrogate: Dichlorodifluoromethane	U				"	0.5100		%	0-0		
Surrogate: Dichlorotetrafluoroethane	U				"	2.000E-2		%	0-0		
Surrogate: Trichlorofluoromethane	U				"	0.2350		%	0-0		
Surrogate: 1,1,2-trichloro-1,2,2-trifluoroethane (Freon)	U				"	7.200E-2		%	0-0		
Surrogate: 1,1,1-Trichloroethane	U				"	4.000E-3		%	0-0		
Surrogate: Carbon tetrachloride	U				"	8.300E-2		%	0-0		



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Air Division, US EPA Region 5  
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Chicago IL, 60605

Project: BP Whiting Refinery  
Project Number: [none]  
Project Manager: Motria Caudill

**Reported:**  
Jan-30-15 16:21

**Air Toxics by GC/MS, EPA TO-15 (modified) - Quality Control**  
**US EPA Region 5 Chicago Regional Laboratory**

**Batch B410041 - ColdTrap Dehydration**

LCS (B410041-BS1)

Prepared & Analyzed: Oct-02-14

Analyte	Result	Flags / Qualifiers	MDL	Reporting Limit	Units	Spike Level	Source Result	%REC Limits	RPD	RPD Limit
Propene	0.511	Research	5.00E-3	0.0500	ppbv	0.5000		102% 76-112		
Chloromethane	0.487		5.00E-3	0.0250	"	0.5000		97% 77.6-116		
Vinyl chloride	0.491		5.00E-3	0.0250	"	0.5000		98% 77.4-117		
1,3-butadiene	0.493		5.00E-3	0.0250	"	0.5000		99% 77.7-115		
Bromomethane	0.488		5.00E-3	0.0250	"	0.5000		98% 75.2-117		
Chloroethane	0.494		5.00E-3	0.0250	"	0.5000		99% 79.8-114		
Ethanol	0.713	J	5.00E-3	0.0250	"	0.5000		143% 50-124		
Acrolein	0.519		5.00E-3	0.0250	"	0.5000		104% 67.9-130		
Isopropyl alcohol	0.427	J	5.00E-3	0.0250	"	0.5000		85% 81-106		
Acetone	0.597	J	5.00E-3	0.0500	"	0.5000		119% 60-137		
1,1-Dichloroethene	0.502		5.00E-3	0.0250	"	0.5000		100% 77.3-118		
Methylene chloride	0.503		5.00E-3	0.0250	"	0.5000		101% 78.7-117		
Methyl tert-butyl ether	0.516		5.00E-3	0.0250	"	0.5000		103% 79.1-118		
1,1-Dichloroethane	0.498		5.00E-3	0.0250	"	0.5000		100% 79.8-117		
Vinyl acetate	0.509		5.00E-3	0.0250	"	0.5000		102% 85-106		
Hexane	0.507		5.00E-3	0.0250	"	0.5000		101% 70.1-121		
2-Butanone	0.509		5.00E-3	0.0500	"	0.5000		102% 82-108		
cis-1,2-Dichloroethene	0.508		5.00E-3	0.0250	"	0.5000		102% 78.1-115		
trans-1,2-Dichloroethene	0.496		5.00E-3	0.0250	"	0.5000		99% 0-200		
Chloroform	0.492		5.00E-3	0.0250	"	0.5000		98% 79.6-115		
Ethyl acetate	0.501		5.00E-3	0.0250	"	0.5000		100% 0-200		
1,2-Dichloroethane	0.496		5.00E-3	0.0250	"	0.5000		99% 79.8-115		
Cyclohexane	0.480	J	5.00E-3	0.0500	"	0.5000		96% 72.5-119		
Tetrahydrofuran	0.512		5.00E-3	0.0250	"	0.5000		102% 0-200		
Benzene	0.505		5.00E-3	0.0250	"	0.5000		101% 75.7-118		
n-Heptane	0.517		5.00E-3	0.0250	"	0.5000		103% 66.9-152		
1,2-Dichloropropane	0.503		5.00E-3	0.0250	"	0.5000		101% 76.8-118		
Trichloroethene	0.482		5.00E-3	0.0250	"	0.5000		96% 70.1-119		
Methyl methacrylate	0.536		5.00E-3	0.0250	"	0.5000		107% 0-200		
1,4-Dioxane	0.503		5.00E-3	0.0250	"	0.5000		101% 54.7-150		
cis-1,3-Dichloropropene	0.540		5.00E-3	0.0250	"	0.5000		108% 75.5-115		
4-Methyl-2-pentanone	0.503		5.00E-3	0.0250	"	0.5000		101% 62.9-133		
trans-1,3-Dichloropropene	0.515		5.00E-3	0.0250	"	0.5000		103% 75.8-117		
1,1,2-Trichloroethane	0.487		5.00E-3	0.0250	"	0.5000		97% 92.3-106		



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Project: BP Whiting Refinery  
Project Number: [none]  
Project Manager: Motria Caudill

**Reported:**  
Jan-30-15 16:21

**Air Toxics by GC/MS, EPA TO-15 (modified) - Quality Control**  
**US EPA Region 5 Chicago Regional Laboratory**

**Batch B410041 - ColdTrap Dehydration**

LCS (B410041-BS1)

Prepared & Analyzed: Oct-02-14

Analyte	Result	Flags / Qualifiers	MDL	Reporting Limit	Units	Spike Level	Source Result	%REC Limits	RPD	RPD Limit
Dibromochloromethane	0.531		5.00E-3	0.0250	ppbv	0.5000		106%	69-132	
Toluene	0.538		5.00E-3	0.0250	"	0.5000		108%	73.2-120	
2-Hexanone	0.517		5.00E-3	0.0250	"	0.5000		103%	76-110	
1,2-Dibromoethane (EDB)	0.512		5.00E-3	0.0250	"	0.5000		102%	75.5-118	
Tetrachloroethene	0.485		5.00E-3	0.0250	"	0.5000		97%	67.1-125	
Chlorobenzene	0.500		5.00E-3	0.0250	"	0.5000		100%	68.5-121	
Ethylbenzene	0.503		5.00E-3	0.0250	"	0.5000		101%	74.9-118	
m+p-Xylene	1.01		0.0100	0.0500	"	1.000		101%	79.8-121	
Bromoform	0.482		5.00E-3	0.0250	"	0.5000		96%	72.4-119	
Styrene	0.499		5.00E-3	0.0250	"	0.5000		100%	71.5-122	
1,1,2,2-Tetrachloroethane	0.490		5.00E-3	0.0250	"	0.5000		98%	92-106	
o-Xylene	0.503		5.00E-3	0.0250	"	0.5000		101%	77.6-124	
4-ethyltoluene	0.497	K	5.00E-3	0.0250	"	0.5000		99%	96.7-122	
1,3,5-Trimethylbenzene	0.492		5.00E-3	0.0250	"	0.5000		98%	74.4-121	
1,2,4-Trimethylbenzene	0.504		5.00E-3	0.0250	"	0.5000		101%	71.9-126	
1,3-Dichlorobenzene	0.465		5.00E-3	0.0250	"	0.5000		93%	67.9-132	
Benzyl chloride	0.499		5.00E-3	0.0250	"	0.5000		100%	60.7-134	
1,4-Dichlorobenzene	0.474		5.00E-3	0.0250	"	0.5000		95%	65.4-136	
1,2-Dichlorobenzene	0.481		5.00E-3	0.0250	"	0.5000		96%	69.3-129	
1,2,4-Trichlorobenzene	0.552		5.00E-3	0.0250	"	0.5000		110%	39.7-186	
Naphthalene	0.623	J	5.00E-3	0.0250	"				40-200	
Surrogate: Dichlorodifluoromethane	0.476				"	0.5000		95%	77.8-116	
Surrogate: Dichlorotetrafluoroethane	0.463				"	0.5000		93%	89-108	
Surrogate: Trichlorofluoromethane	0.494				"	0.5000		99%	78.6-114	
Surrogate:	0.477				"	0.5000		95%	75.3-119	
1,1,2-trichloro-1,2,2-trifluoroethane (Freon										
Surrogate: 1,1,1-Trichloroethane	0.503				"	0.5000		101%	92.5-105	
Surrogate: Carbon tetrachloride	0.509				"	0.5000		102%	76.3-118	



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Chicago IL, 60605

Project: BP Whiting Refinery  
Project Number: [none]  
Project Manager: Motria Caudill

**Reported:**  
Jan-30-15 16:21

**Air Toxics by GC/MS, EPA TO-15 (modified) - Quality Control**  
**US EPA Region 5 Chicago Regional Laboratory**

**Batch B410041 - ColdTrap Dehydration**

LCS Dup (B410041-BSD1)

Prepared & Analyzed: Oct-02-14

Analyte	Result	Flags / Qualifiers	MDL	Reporting Limit	Units	Spike Level	Source Result	%REC Limits	RPD	RPD Limit
Propene	0.431	Research	5.00E-3	0.0500	ppbv	0.5000		86% 76-112	17	19.6
Chloromethane	0.492		5.00E-3	0.0250	"	0.5000		98% 77.6-116	1	26.9
Vinyl chloride	0.476		5.00E-3	0.0250	"	0.5000		95% 77.4-117	3	25.1
1,3-butadiene	0.457		5.00E-3	0.0250	"	0.5000		91% 77.7-115	8	33.2
Bromomethane	0.491		5.00E-3	0.0250	"	0.5000		98% 75.2-117	0.6	26.6
Chloroethane	0.489		5.00E-3	0.0250	"	0.5000		98% 79.8-114	1	29.5
Ethanol	0.590	J	5.00E-3	0.0250	"	0.5000		118% 50-124	19	200
Acrolein	0.489		5.00E-3	0.0250	"	0.5000		98% 67.9-130	6	29.8
Isopropyl alcohol	0.586	J	5.00E-3	0.0250	"	0.5000		117% 81-106	31	25
Acetone	0.541	J	5.00E-3	0.0500	"	0.5000		108% 60-137	10	28.7
1,1-Dichloroethene	0.492		5.00E-3	0.0250	"	0.5000		98% 77.3-118	2	15.9
Methylene chloride	0.512		5.00E-3	0.0250	"	0.5000		102% 78.7-117	2	20.7
Methyl tert-butyl ether	0.491		5.00E-3	0.0250	"	0.5000		98% 79.1-118	5	31.9
1,1-Dichloroethane	0.496		5.00E-3	0.0250	"	0.5000		99% 79.8-117	0.3	13.1
Vinyl acetate	0.486		5.00E-3	0.0250	"	0.5000		97% 85-106	5	200
Hexane	0.484		5.00E-3	0.0250	"	0.5000		97% 70.1-121	5	43.5
2-Butanone	0.500		5.00E-3	0.0500	"	0.5000		100% 82-108	2	25
cis-1,2-Dichloroethene	0.503		5.00E-3	0.0250	"	0.5000		101% 78.1-115	1	29.6
trans-1,2-Dichloroethene	0.502		5.00E-3	0.0250	"	0.5000		100% 0-200	1	25
Chloroform	0.512		5.00E-3	0.0250	"	0.5000		102% 79.6-115	4	25.2
Ethyl acetate	0.503		5.00E-3	0.0250	"	0.5000		101% 0-200	0.4	25
1,2-Dichloroethane	0.519		5.00E-3	0.0250	"	0.5000		104% 79.8-115	4	24.6
Cyclohexane	0.510	J	5.00E-3	0.0500	"	0.5000		102% 72.5-119	6	34.5
Tetrahydrofuran	0.508		5.00E-3	0.0250	"	0.5000		102% 0-200	0.8	25
Benzene	0.511		5.00E-3	0.0250	"	0.5000		102% 75.7-118	1	27.4
n-Heptane	0.501		5.00E-3	0.0250	"	0.5000		100% 66.9-152	3	25
1,2-Dichloropropane	0.525		5.00E-3	0.0250	"	0.5000		105% 76.8-118	4	25.3
Trichloroethene	0.501		5.00E-3	0.0250	"	0.5000		100% 70.1-119	4	34.1
Methyl methacrylate	0.541		5.00E-3	0.0250	"	0.5000		108% 0-200	1	200
1,4-Dioxane	0.524		5.00E-3	0.0250	"	0.5000		105% 54.7-150	4	58.6
cis-1,3-Dichloropropene	0.533		5.00E-3	0.0250	"	0.5000		107% 75.5-115	1	31.1
4-Methyl-2-pentanone	0.485		5.00E-3	0.0250	"	0.5000		97% 62.9-133	4	42
trans-1,3-Dichloropropene	0.532		5.00E-3	0.0250	"	0.5000		106% 75.8-117	3	31.7
1,1,2-Trichloroethane	0.520		5.00E-3	0.0250	"	0.5000		104% 92.3-106	7	11.5



Environmental Protection Agency Region 5  
**Chicago Regional Laboratory**

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Chicago IL, 60605

Project: BP Whiting Refinery  
Project Number: [none]  
Project Manager: Motria Caudill

**Reported:**  
Jan-30-15 16:21

**Air Toxics by GC/MS, EPA TO-15 (modified) - Quality Control**  
**US EPA Region 5 Chicago Regional Laboratory**

**Batch B410041 - ColdTrap Dehydration**

LCS Dup (B410041-BSD1)

Prepared & Analyzed: Oct-02-14

Analyte	Result	Flags / Qualifiers	MDL	Reporting Limit	Units	Spike Level	Source Result	%REC Limits	RPD	RPD Limit
Dibromochloromethane	0.562		5.00E-3	0.0250	ppbv	0.5000		112% 69-132	6	25
Toluene	0.526		5.00E-3	0.0250	"	0.5000		105% 73.2-120	2	30.6
2-Hexanone	0.507		5.00E-3	0.0250	"	0.5000		101% 76-110	2	46.8
1,2-Dibromoethane (EDB)	0.537		5.00E-3	0.0250	"	0.5000		107% 75.5-118	5	31.5
Tetrachloroethene	0.525		5.00E-3	0.0250	"	0.5000		105% 67.1-125	8	13.8
Chlorobenzene	0.509		5.00E-3	0.0250	"	0.5000		102% 68.5-121	2	31.9
Ethylbenzene	0.493		5.00E-3	0.0250	"	0.5000		99% 74.9-118	2	31.6
m+p-Xylene	0.984		0.0100	0.0500	"	1.000		98% 79.8-121	3	28.9
Bromoform	0.498		5.00E-3	0.0250	"	0.5000		100% 72.4-119	3	34.6
Styrene	0.496		5.00E-3	0.0250	"	0.5000		99% 71.5-122	0.6	19.7
1,1,2,2-Tetrachloroethane	0.513		5.00E-3	0.0250	"	0.5000		103% 92-106	4	11.5
o-Xylene	0.495		5.00E-3	0.0250	"	0.5000		99% 77.6-124	2	28.7
4-ethyltoluene	0.480	K	5.00E-3	0.0250	"	0.5000		96% 96.7-122	3	25
1,3,5-Trimethylbenzene	0.478		5.00E-3	0.0250	"	0.5000		96% 74.4-121	3	29.8
1,2,4-Trimethylbenzene	0.485		5.00E-3	0.0250	"	0.5000		97% 71.9-126	4	32.1
1,3-Dichlorobenzene	0.480		5.00E-3	0.0250	"	0.5000		96% 67.9-132	3	37.9
Benzyl chloride	0.485		5.00E-3	0.0250	"	0.5000		97% 60.7-134	3	48.3
1,4-Dichlorobenzene	0.480		5.00E-3	0.0250	"	0.5000		96% 65.4-136	1	39.6
1,2-Dichlorobenzene	0.484		5.00E-3	0.0250	"	0.5000		97% 69.3-129	0.6	34
1,2,4-Trichlorobenzene	0.565		5.00E-3	0.0250	"	0.5000		113% 39.7-186	2	77.1
Naphthalene	0.601	J	5.00E-3	0.0250	"			40-200	4	200
Surrogate: Dichlorodifluoromethane	0.475				"	0.5000		95% 77.8-116		
Surrogate: Dichlorotetrafluoroethane	0.466				"	0.5000		93% 89-108		
Surrogate: Trichlorofluoromethane	0.496				"	0.5000		99% 78.6-114		
Surrogate:	0.484				"	0.5000		97% 75.3-119		
1,1,2-trichloro-1,2,2-trifluoroethane (Freon)										
Surrogate: 1,1,1-Trichloroethane	0.519				"	0.5000		104% 92.5-105		
Surrogate: Carbon tetrachloride	0.523				"	0.5000		105% 76.3-118		



Environmental Protection Agency Region 5  
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Project: BP Whiting Refinery  
Project Number: [none]  
Project Manager: Motria Caudill

**Reported:**  
Jan-30-15 16:21

**Air Toxics by GC/MS, EPA TO-15 (modified) - Quality Control**  
**US EPA Region 5 Chicago Regional Laboratory**

**Batch B410041 - ColdTrap Dehydration**

Duplicate (B410041-DUP1)		Source: 1410001-01		Prepared & Analyzed: Oct-02-14							
Analyte	Result	Flags / Qualifiers	MDL	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit
Propene	1.51	K, Research	5.00E-3	0.0500	ppbv		1.40			8	30
Chloromethane	0.519		5.00E-3	0.0250	"		0.500			4	30
Vinyl chloride	U		5.00E-3	0.0250	"		U				30
1,3-butadiene	0.0519	B, K	5.00E-3	0.0250	"		0.0564			8	30
Bromomethane	7.55E-3		5.00E-3	0.0250	"		7.93E-3			5	30
Chloroethane	U		5.00E-3	0.0250	"		U				30
Ethanol	1.34	J	5.00E-3	0.0250	"		1.49			11	40
Acrolein	0.714	K	5.00E-3	0.0250	"		0.780			9	40
Isopropyl alcohol	6.32	J	5.00E-3	0.0250	"		6.39			1	40
Acetone	4.08	J	5.00E-3	0.0500	"		4.12			1	40
1,1-Dichloroethene	U		5.00E-3	0.0250	"		U				30
Methylene chloride	0.109		5.00E-3	0.0250	"		0.120			10	30
Methyl tert-butyl ether	U		5.00E-3	0.0250	"		U				40
1,1-Dichloroethane	U		5.00E-3	0.0250	"		U				30
Vinyl acetate	7.69E-3		5.00E-3	0.0250	"		0.0109			35	40
Hexane	0.402		5.00E-3	0.0250	"		0.477			17	30
2-Butanone	0.451		5.00E-3	0.0500	"		0.485			7	40
cis-1,2-Dichloroethene	U		5.00E-3	0.0250	"		U				30
trans-1,2-Dichloroethene	U		5.00E-3	0.0250	"		U				30
Chloroform	0.0328		5.00E-3	0.0250	"		0.0353			7	30
Ethyl acetate	0.233		5.00E-3	0.0250	"		0.238			2	40
1,2-Dichloroethane	0.0120		5.00E-3	0.0250	"		0.0169			34	30
Cyclohexane	0.237	J	5.00E-3	0.0500	"		0.237			0.06	30
Tetrahydrofuran	U		5.00E-3	0.0250	"		U				40
Benzene	0.318		5.00E-3	0.0250	"		0.339			7	30
n-Heptane	0.152		5.00E-3	0.0250	"		0.206			30	30
1,2-Dichloropropane	U		5.00E-3	0.0250	"		U				30
Trichloroethene	U		5.00E-3	0.0250	"		U				30
Methyl methacrylate	U		5.00E-3	0.0250	"		U				40
1,4-Dioxane	U		5.00E-3	0.0250	"		6.12E-3				40
cis-1,3-Dichloropropene	U		5.00E-3	0.0250	"		U				30
4-Methyl-2-pentanone	0.0495		5.00E-3	0.0250	"		0.0602			19	40
trans-1,3-Dichloropropene	U		5.00E-3	0.0250	"		U				30
1,1,2-Trichloroethane	U		5.00E-3	0.0250	"		U				30



Environmental Protection Agency Region 5  
**Chicago Regional Laboratory**

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Air Division, US EPA Region 5  
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Chicago IL, 60605

Project: BP Whiting Refinery  
Project Number: [none]  
Project Manager: Motria Caudill

**Reported:**  
Jan-30-15 16:21

**Air Toxics by GC/MS, EPA TO-15 (modified) - Quality Control**  
**US EPA Region 5 Chicago Regional Laboratory**

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Duplicate (B410041-DUP1)		Source: 1410001-01		Prepared & Analyzed: Oct-02-14							
Analyte	Result	Flags / Qualifiers	MDL	Reporting Limit	Units	Spike Level	Source Result	%REC Limits	RPD	RPD Limit	
Dibromochloromethane	U	K	5.00E-3	0.0250	ppbv		U			30	
Toluene	0.973		5.00E-3	0.0250	"		1.01		4	30	
2-Hexanone	U		5.00E-3	0.0250	"		U			40	
1,2-Dibromoethane (EDB)	U		5.00E-3	0.0250	"		U			30	
Tetrachloroethene	0.0275		5.00E-3	0.0250	"		0.0345		23	30	
Chlorobenzene	U		5.00E-3	0.0250	"		U			30	
Ethylbenzene	0.113		5.00E-3	0.0250	"		0.123		8	30	
m+p-Xylene	0.353		0.0100	0.0500	"		0.394		11	30	
Bromoform	U		5.00E-3	0.0250	"		U			30	
Styrene	0.0368		5.00E-3	0.0250	"		0.0416		12	30	
1,1,2,2-Tetrachloroethane	U		5.00E-3	0.0250	"		U			30	
o-Xylene	0.142		5.00E-3	0.0250	"		0.153		8	30	
4-ethyltoluene	0.155		5.00E-3	0.0250	"		0.162		4	30	
1,3,5-Trimethylbenzene	0.0455		5.00E-3	0.0250	"		0.0475		4	30	
1,2,4-Trimethylbenzene	0.156		5.00E-3	0.0250	"		0.161		3	30	
1,3-Dichlorobenzene	U		5.00E-3	0.0250	"		U			30	
Benzyl chloride	U		5.00E-3	0.0250	"		U			30	
1,4-Dichlorobenzene	U		5.00E-3	0.0250	"		U			30	
1,2-Dichlorobenzene	U		5.00E-3	0.0250	"		U			30	
1,2,4-Trichlorobenzene	U		5.00E-3	0.0250	"		U			30	
Naphthalene	0.818	J	5.00E-3	0.0250	"		0.862		5	30	
Surrogate: Dichlorodifluoromethane	0.462	J			"	0.5100		91%	70-130		
Surrogate: Dichlorotetrafluoroethane	0.0221				"	2.000E-2		110%	50-150		
Surrogate: Trichlorofluoromethane	0.225				"	0.2350		96%	70-130		
Surrogate:	0.0820				"	7.200E-2		114%	70-130		
1,1,2-trichloro-1,2,2-trifluoroethane (Freon											
Surrogate: 1,1,1-Trichloroethane	4.08E-3				"	4.000E-3		102%	50-150		
Surrogate: Carbon tetrachloride	0.0796				"	8.300E-2		96%	70-130		



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Project: BP Whiting Refinery  
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**Notes and Definitions**

Research	Samples analyzed while the method is under development and contain results of unknown quality. No SOP in place at time of data release. Client was notified and accepted the terms as stated.
K	The identification of the analyte is acceptable; the reported value may be biased high. The actual value is expected to be less than the reported value.
J	The identification of the analyte is acceptable; the reported value is an estimate.
BC	Analyte is detected in the sample within 5x the amount detected in the canister certification blank and may have a high bias from residual contamination in the canister used to sample.
B	Analyte concentration is < 5x that in the associated method blank(s); this concentration may be a high-bias estimate.
U	Not Detected
NR	Not Reported